

$$(41) \quad \frac{\cos}{\sec} + \frac{\sin}{\csc} = \sec^2 - \tan^2$$

$$\frac{\cos}{\frac{1}{\cos}} + \frac{\sin}{\frac{1}{\sin}} = 1$$

$$\frac{1}{\frac{1}{x}} = 1 \cdot \frac{x}{1}$$

$$\begin{aligned}
 (42) \quad \frac{\sin^2}{\cos} &= \sec - \cos \\
 \frac{1 - \cos^2}{\cos} &= \frac{1}{\cos} - \cos \left( \frac{\cos}{\cos} \right) \\
 \frac{1}{\cos} - \frac{\cos^2}{\cos} &= \frac{1}{\cos} - \frac{\cos^2}{\cos} \\
 \sec - \cos &= \frac{1 - \cos^2}{\cos} \\
 &= \frac{\sin^2}{\cos}
 \end{aligned}$$

$$\textcircled{44} \quad \frac{\cos}{\sin \cot} = 1$$

$$\frac{\cancel{\cos}}{\cancel{\sin} \frac{\cancel{\cos}}{\cancel{\sin}}} = 1$$

$$\cancel{\cos} \cdot \frac{1 \cdot \cancel{\sin}}{\cancel{\sin} \cdot \cancel{\cos}} = 1$$

$$\begin{aligned} & \frac{\text{denom}}{\sin \textcircled{\cot}} = \frac{1}{\tan} \\ & = \cancel{\sin} \frac{\cos}{\cancel{\sin}} = \frac{1}{\frac{\sin}{\cos}} \\ & = \frac{\cos}{\sin} \end{aligned}$$

(49)  $\left(\frac{1+\sin}{1+\sin}\right)$

$$\frac{1}{1-\sin} + \frac{1}{1+\sin} = 2\sec^2$$

$$\frac{1+\sin}{1-\sin^2} + \frac{1-\sin}{1-\sin^2} = \left(\frac{1-\sin}{1-\sin}\right)$$

$$\frac{1+\cancel{\sin} + 1-\cancel{\sin}}{1-\sin^2} =$$

$$\frac{1}{\cos^2} = \sec^2$$

$$\frac{2}{\cos^2} = 2\sec^2$$

(61)

$$\frac{\sec^4 - \tan^4}{\sec^2 + \tan^2} = \sec^2 - \tan^2$$

$$x^4 - y^4$$

$$(x^2 - y^2)(x^2 + y^2)$$

$$\frac{x \cancel{y}}{\cancel{y}}$$

$$\frac{(\sec^2 - \tan^2)(\cancel{\sec^2 + \tan^2})}{\cancel{\sec^2 + \tan^2}} = 1$$

$$\downarrow \quad \checkmark = 1$$

$$(63) \frac{\tan^2 - 1}{\sec^2} = \frac{\tan - \cot}{\tan + \cot}$$

$$\cos^2(\tan^2 - 1) = \frac{\sin}{\cos} - \frac{\cos}{\sin}$$

$$\cos^2\left(\frac{\sin^2}{\cos^2} - 1\right) = \frac{\sin}{\cos} + \frac{\cos}{\sin}$$

$$\sin^2 - \cos^2 \checkmark = \sin^2 - \cos^2$$

$$\frac{x-y}{x+y}$$

$$\frac{x}{x+y} - \frac{y}{x+y}$$

$$\frac{\sin^2 - \cos^2}{\sin \cos}$$

$$\frac{\sin^2 + \cos^2 = 1}{\sin \cos}$$

$$\frac{\sec}{\sec} = \frac{1}{\cos}$$

$$\frac{1}{\sec} = \cos$$

$$(67) \quad (\sec + \csc)(\cos - \sin) = \cot - \tan$$

$$= \sec \cdot \cos - \sec \cdot \sin + \csc \cdot \cos - \csc \cdot \sin$$

$$= \left(\frac{1}{\cos}\right) \cdot \cos - \left(\frac{1}{\cos}\right) \cdot \sin + \left(\frac{1}{\sin}\right) \cdot \cos - \left(\frac{1}{\sin}\right) \cdot \sin$$

$$= \cancel{\frac{\cos}{\cos}} - \frac{\sin}{\cos} + \frac{\cos}{\sin} - \cancel{\frac{\sin}{\sin}}$$

$$= -\tan + \cot$$

$$= \cot - \tan \quad \checkmark$$

$$\textcircled{15} (\sin x + 1)^2 - (\sin x - 1)^2$$

$$\underline{\text{factor}} \quad (\sin x + 1 + \sin x - 1) (\sin x + 1 - (\sin x - 1))$$

$$x^2 - y^2$$

$$(2 \sin x)$$

$$(2)$$

$$(x + y)(x - y)$$

$$4 \sin x$$



HW: 33, 39, ~~45~~ 50, 59, 66

$$\frac{\cos}{1 - \sin} \cdot \left( \frac{1 + \sin}{1 + \sin} \right)$$

$$= \frac{\cos + \cos \sin}{1 - \sin^2}$$

$$= \frac{\cos + \cos \sin}{\cos^2}$$

$$= \frac{1}{\cos} + \frac{\cos \sin}{\cos^2}$$

$$= \frac{1}{\cos} + \frac{\sin}{\cos}$$

conjugate pair

$$x^2 - y^2$$

$$= (x - y)(x + y)$$